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streaks. In really good air they were much narrower and darker, and in some cases very definite and sharply defined.

No bright projections were seen either at the limb or terminator. Bright regions like *Argyre*, *Phætontis*, &c., &c. appeared at times to project slightly beyond the limb, but such effects were clearly ordinary irradiation phenomena.

During the apparition thirty-six whole disc drawings were made, twelve of which are reproduced on the accompanying plate (Plate 3).

Observations of Jupiter and his Satellites made at Mr. Crossley's Observatory, Bermerside, Halifax, during the Opposition 1898–99. By Joseph Gledhill.

The following observations of the physical features presented by the planet *Jupiter* during the opposition 1898–99 were made with the 9-inch Cooke Equatorial Refractor (photo-visual), and a Simms parallel-wire micrometer. The negative eye-pieces generally used had powers of 240 and 330; the power used with the micrometer was 280. The observing conditions were very seldom good and the number of clear nights was very small.

The results are arranged under the following heads :—

I. A description of the principal features seen on the disc of the planet.

II. Transits of the dark and bright spots &c. across the central meridian.

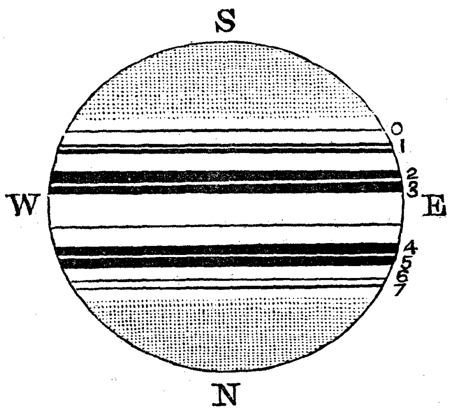
III. Measures.

Latitudes of the dark bands.
Widths of the dark bands and bright zones.
Summary 1895–96 to 1898–99.

IV. Notes on the satellites and their shadows.

V. Phenomena of the satellites.

As will be seen from the diagram, the dark bands are numbered 0, 1, 2, 3, 4, 5, 6, 7. Of these 2 and 3 form the



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southern boundary of the coloured central zone, and 4, 5 form its boundary on the north. In terms of the nomenclature of the *British Astronomical Association*, 0 is the *Southern South Temperate Band*, 1 is the *South Temperate Band*, 2 and 3 form the *South Tropical Belt*, 4 and 5 are the *North Tropical Belt*, 6 is the *North Temperate Band*, and 7 the *Northern North Temperate Band.* The central coloured zone is the *Equatorial Zone.*

I.

Description of the Dark Bands, Spots, and Bright Zones.

Band 0.

1899 April 12, 10½^h (the longitude of the central meridian =29°); a faint narrow band, very little to the south of dark band 1. April 17, 10^h (43°), as on April 12, except that 1 being now narrower than on the 12th, the bright space between 0 and 1 is wider. April 30, 10^h (198°); a faint narrow band bounding the S. polar shading. May 3, 10^h (289°); well seen as on April 30. Bright zone 0 to 1 is wide. May 4, 10^h (79°) and 11^h (116°); as on May 3. May 5, 9^h(194°); faint; at 10^h (230°) the band disappears on the central meridian, *i.e.* it is not seen on the eastern half of the disc when the longitude of the central meridian is about 233°. At this time the eastern half of 1 is broad. May 6, 8½^h (326°); nearly as broad as 1; at 10^h (20°) broader than 1. May 7, 8½^h (116°); as wide and dark as 1; at 9^h 40^m (89°) faint. May 16, 10½^h (102°); seen all across the disc. May 17, 9^h 17^m (208°); the band ceases just a little to the east of where 1 begins to be broader and darker; the end was on the central meridian about 9^h 52½^m (230°). May 26, 9^h (111°); seen all across the disc. May 27, 8^h 45^m (252°); a short portion of the band seen near the *f* limb. May 30, 9^h (352°); as on May 26 at 9^h.

Summary.—This was a narrow but easily seen grey band usually; faint in some longitudes, absent in others; as broad or broader than 1 in some longitudes; suddenly disappeared when the longitude of the central meridian was about 230°.

Band 1 (*South Temperate Band*).

1899 January 16, 19^h (7°); faint. The "shoulders" are now about central; the band has a darker portion just over the *f* shoulder. January 23, 19^h (339°); a strap-like band; it is wider and darker over the Red Spot. April 16, 11^h 19^m (300°); the *p* shoulder is near the *f* limb; the band is strap-like. April 30, 10^h (198°); a narrow and rather faint band. At 11^h (234°) it seemed wider and darker near the *f* limb. May 3, 8^h (217°); broader at the *f* end than elsewhere; at 10¼^h (298°) broader

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than at 8^h or 9^h; at 11^h (325°) as at $10\frac{1}{4}^h$. May 4, 9^h (43°); broader and darker over the Red Spot. May 5, 9^h (194°); darker and broader near the *f* limb than elsewhere; at 10^h (230°) the broader part is from the middle to the *f* limb; at 11^h 20^m (278°) as broad as 2 or 3. May 6, $8\frac{1}{2}^h$ (326°); a broad band; at 10^h the band seemed to curve up to the south over the great hollow between the two shoulders. May 7, 8^h (98°); narrow; at 11^h (207°) the eastern half is broader and darker than the western. May 15, $9\frac{1}{2}^h$ (275°); broader than 2 or 3 or 4, but not nearly so dark; strap-like. May 16, $8\frac{1}{2}^h$ (30°); not broad; not so dark as band 6. May 17, 9^h (198°); narrow and faint, and variable in width and darkness; at 9^h 17^m (208°) it begins to broaden and darken; at 10^h and 11^h (234° and 270°) a broad and conspicuous band. May 25, 8^h (284°); broad all the way across the disc. May 26, 9^h (111°); not broad; rather faint. A gap in it and a dusky spot on it near the central meridian at 11^h (183°); wider near the *f* limb. May 27, $8\frac{1}{2}^h$ (243°); broad all the way across the disc; at 10^h 20^m (310°) a wider part on the central meridian extending to *f* limb. May 28, 9^h (52°) faint all across the disc. May 31, 8^h (106°) and 9^h (143°); faint; at 10^h wider near the *f* limb. June 1, 9^h (293°); faint. June 2, 10^h (119°); faint; a broader part near the *f* limb. June 3, 10^h (270°); a broad, strap-like band. June 15, $9\frac{1}{4}^h$ (246°); a broader part near the *f* limb.

Summary.—In general a grey, strap-like band; varies considerably in breadth and depth of tone in certain longitudes. In some parts it is sinuous, and consists of a succession of light and dark portions; at least one break in it and one cloudy spot on it.

Band 2 *and the Double Band* 2.3.

January 16, 19^h (7°). The Red Spot, the two shoulders, and the hollow between them seem very little, if at all, changed since the last opposition. During the present opposition band 2 has presented no special features calling for remark. Band 2 is now seen much less dark than 3 all the way from the *p* shoulder to the *p* limb. April 12, $10\frac{1}{2}^h$ (29°); 2 and 3 well separated. April 16, 12^h (325°); as on April 12; 2 not so dark as 3. April 17, 10^h (43°); 2 and 3 separated by a fine bright line; so also on April 30 at 10^h (198°). May 3, 8^h (217°); 2 and 3 together darker than 4.5. May 4, 10^h (79°); 2 and 3 very close, and as broad as 4.5; at 11^h (116°) equally dark and darker than 4.5. May 5, 8^h (157°); 2 as dark as 3; at 11^h 20^m (278°) 2 and 3 not dark. May 7, 8^h (98°); 2.3 much darker than 4.5, and narrower; at 11^h (207°) 2.3 and 4.5 much alike in depth of tone and breadth. May 15, $9\frac{1}{2}^h$ (275°); 2.3 as broad as 4.5, and no darker than 4.5. May 16, $10\frac{1}{2}^h$ (102°); 2.3 the darkest feature of the disc; as broad as 4.5. May 25, 8^h (284°); 2.3 and 4.5

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equally broad and dark. May 31, 8^h (106°); 2.3 much darker than 4.5. June 14, 9^h (86°); 2.3 a dark ruddy colour.

Summary.—Band 2 was almost featureless. An hour or two before the Red Spot reaches the central meridian this band becomes paler and narrower, and the bright space between 2 and 3 wider. This local weakening of band 2 is noteworthy, as it seems permanent. It has been noticed here for several years. It is unbroken, except where it bends down to 3 and disappears between the two shoulders. Band 3 has been one of the best marked features during this and several preceding oppositions. Its most noteworthy features were a considerable number of dark spots on its northern edge, short breaks or bright gaps, and its uniformly dark tint in all longitudes. In some presentations of the disc as many as six long dark spots could be seen at one time. Some lay on the N. edge of the band, in contact with it, and also projecting into the coloured central zone; others were probably short portions of the band itself, separated from each other by bright spaces of about the same length. It was easy to think of these dark pieces of band and bright separating spaces as forming a row of festoons from limb to limb. There was a dark spot on 3 about in the longitude of the slope of the *p* shoulder; another in that of the middle of the great hollow. In the case of the dark spot which was on the central meridian about $11^h\ 20^m$ May 5 we have an example of the detachment of a short portion of the belt from the rest with a narrow bright space at each end. The dark portion had lost its parallelism to the general direction of the belt, its *p* end being more N. than the *f* end. When the dark spots lay on the N. edge of the band the latter was sometimes seen much narrower and fainter than elsewhere. And these spots stood out with greater distinctness owing to the presence of a narrow bright space along the northern edge of the band—a space free from yellow colour, and much brighter than the coloured zone (central) in which it lay. At $9^h\ 12^m$ June 6 the band seemed cut up into lengths separated by bright spaces. The lengths varied from $2''$ or $3''$ to several seconds of arc. The dark spot just under the *p* shoulder seemed on June 16 to have a fainter portion stretching away to the N.E., and thus connecting it with the faint narrow band which lay along the middle of the coloured zone.

Bands 4.5.

This broad, double, dark band has changed much since the opposition of 1897–8. April 17, 10^h; three dark spots lay on band 5 and one on band 4, to the east of the central meridian. April 30, 10^h; a little west of the central meridian there was a break or gap in 4 and a dark spot on 5; while to the east of that meridian 5 was quite a faint band. May 3, $10\frac{1}{4}^h$; the *f* half of 5 was a faint, inconspicuous band, while 4 remained dark and

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broad; at 11^{h}, to the east of the central meridian, 4 had a curved portion extending into the coloured central zone; at 11^{h} 10^{m} there was a bright gap or break in 5 to the east of the central meridian. May 6, 8$\frac{1}{2}^{h}$; bands 4.5 were diffuse; 4 was darker than 5 and more continuous. At 10^{h} a straight portion of 4 was seen near the *f* limb, while the rest of the two bands was lighter, diffuse, and contained bright gaps and dark grey portions. May 7, 10^{h}; there were breaks or gaps in both bands, and a dark spot on the N edge of 5. May 5, 8^{h}; the bands were diffuse and full of gaps. May 16, 10$\frac{1}{2}^{h}$; two very conspicuous bright gaps in band 5 were seen. May 17, 9^{h}; band 5 was very faint to the east of the central meridian, and at 11^{h} three bright gaps were seen in it. May 30, 10^{h}; a bright gap in 5 and a dark spot over it in band 4 were well seen.

Summary.—The principal features of this broad double band (4.5) were diffuseness along the N. edge of 4, sharpness of the S. edge of 5, dark spots on 5 or its separation into dark pieces, bright gaps in band 5, variable width and the frequent curvature of portions of 4. In some places a narrow, dark piece of 4 seemed to lie on a light grey ground. The two bands were in most longitudes separated by a narrow bright streak; the two together were never less broad than 3.4, were often broader, often less dark than they, and sometimes quite as dark.

Bands 6 *and* 7.

May 7, 9^{h}, band 6 was faint. May 15, 9$\frac{1}{2}^{h}$, it was invisible to the east of the central meridian; 7 was darker than 6, and darker than 1. May 17, 9^{h}, bands 6 and 7 were close, narrow, but well seen. May 23, 11^{h}, both well seen. May 30, 9^{h}, band 7 was faint; 6 not so broad as 1, but darker; at 10^{h} 6 was much fainter than 7. June 3, 10^{h}, 6 and 7 close, narrow, darker than 1. June 16, 10^{h}, 6 was a delicate, narrow, and rather faint band; 7 much darker and broader than 6.

Summary.—These bands were usually far from being conspicuous; in certain longitudes, however, they were very marked features. They were not continuous all round the planet.

The Red Spot.

The region (between the two shoulders) in which this remarkable object lies was carefully examined on more than twenty nights. Portions of its outline were glimpsed occasionally on several nights; but it was not well seen till June 16, between 8^{h} and 9^{h}; and the portion best seen was the S. half of the curve. The centre of the spot seemed to be in about the same latitude as the south edge of the great *f* shoulder, and its longitude was a little behind that of the middle of the hollow; in other words, the ellipse seemed to be not quite symmetrically placed with reference to the shoulders and the hollow between

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them. Neither colour nor shading of any kind was seen within the ellipse; nor did the space between the two shoulders in which the Red Spot lies ever appear brighter than the bright zone to the east or west of it. The following end of the spot was often glimpsed.

The Bright Zones.

On all occasions it was noted that the parts of the disc to the S. of band 2 were much brighter than those to the N. of band 5, and the zone between 1 and 2 was the brightest of all. The great central coloured zone between 3 and 4 was, of course, always a most striking feature: its colour was a warm yellow. Here, too, may be mentioned a narrow, bright, colourless zone close to dark band 3 on its N. edge, and a similar one on the S. edge of dark band 4: both were parts of the great central zone. It was in these two narrow bright zones that the dark spots under 3 and on 4 lay.

The Narrow Equatorial Band.

Between dark bands 3 and 4, but nearer to 4 than to 3, a narrow band was nearly always seen. On nights of bad definition it seemed to merge into bands 4.5, and with them to form a very broad dark zone across the disc.

Dark and Bright Spots.

Some remarks have already been made on the dark spots seen on the dark bands, or projecting from their edges. Not one, perhaps, was seen quite detached from a dark band, and lying isolated in a bright zone. It is just possible, however, that a dark spot seen to the west of the central meridian at 9^h, May 5, was really not in contact with band 5, but lay in the bright zone between 5 and 6: its length was a little more than 1$''$, and it was noted that directly above it (to the south) a gap of corresponding size existed in the dark band 5, just as if a short piece of the dark band had become detached and moved a little northwards into the bright zone between 5 and 6.

Two large diffuse grey spots were seen on band 0 at 9^h 20^m, May 5.

A dusky spot was seen on band 1 at 11^h, May 26; it was on the band, but also extended into the bright zone between bands 0 and 1. Close to it, to the east, the dark band had a gap in it, as if the spot had been drawn from the band, and moved a little south and west.

There were very few dark spots on band 4, the most noteworthy one being that which was on the central meridian about 11^h, May 30. Here, again, a gap in band 5 was seen just under (to N. of) the dark spot on 4.

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II.

Transits of Dark Spots.

On Dark Band 3.

	1899.	h	m	°
a	Jan. 16	18	50	1
	May 3	12	5	5
	6	9	35	5
b	May 3	10	13	297
	15	10	5	297
	27	10	0	298
c	May 7	9	47	163
d	May 3	11	20	337
	6	8	53	341
e	Jan. 24	19	21	352
f	May 7	8	43	124
	26	9	15	120
g	Apr. 17	10	30	61
h	May 5	11	20	278
	15	9	27	276
	17	11	15	280
i	Apr. 17	11	5	82
j	May 5	9	5	197
k	May 17	8	46	190
	26	11	8	188
	31	10	18	190

	1899.	h	m	°
l	May 17	9	45	225
	June 3	8	49	227
m	May 31	9	45	170
	June 17	8	47	169
n	May 17	10	33	254
	27	8	42	251
o	May 26	9	5	114
p	May 25	10	42	22
q	May 27	10	46	325
r	May 31	9	7	147
s	June 2	9	25	98
t	June 3	9	13	241
	July 26	8	15	247
u	June 3	10	0	270
	July 26	8	45	265
v	June 15	8	28	217
w	June 16	9	37	49
x	June 16	8	50	15

On Dark Band 4.

	1899.	h	m	°		1899.	h	m	°
a	Apr. 17	11	10	85	*b*	May 30	11	0	65

On Dark Band 5.

	1899.	h	m	°		1899.	h	m	°
a	Jan. 24	19	30	357	*c*	May 7	10	3	173
b	Apr. 17	10	0	43	*d*	May 31	9	28	160

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On Dark Band 1.

1899.	h m	°
May 26	11 0	184

Transits of Bright Spots.

On Dark Band 5.

	1899.	h m	°		1899.	h m	°
a	May 28	9 20	64	*c*	May 27	10 45	325
	30	11 0	65		June 6	8 55	321
	June 6	11 40	61				
	11	10 48	61	*d*	May 16	10 40	108
	14	8 20	59		23	11 20	105
	16	9 55	60	*e*	May 23	10 30	75
b	July 26	8 55	271	*f*	May 3	11 10	331

On Dark Band 3.

1899.	h m	°	1899.	h m	°
May 27	8 57	259	June 15	9 32	256

The Red Spot.

As this object was but seldom seen, the transit of the middle of the great hollow was observed, this point and the centre of the Red Spot being very nearly in the same longitude.

1899.	h m	°		h m	°
April 12	10 36	32	June 4	9 17	34
16	13 52	32	6	10 56	34
17	9 41	31	9	8 25	34
26	12 3	31	11	10 3	34
May 4	8 44	34	14	7 32	33
6	10 20	32	16	9 12	34
8	11 57	32	21	8 20	34
16	8 34	32	26	7 28	34
18	10 14	33	July 5	9 56	35
25	11 0	33	15	8 15	35
28	8 30	33	27	8 10	34
30	10 8	33			

The p *Shoulder.*

This feature not being a well-defined point was not easy to observe very consistently, as the following discordant results will show :—

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1899.	h m	°		h m	°
May 6	9 50	14	June 6	10 20	13
16	8 13	19	11	9 35	17
25	10 32	16	16	8 40	15
30	9 37	15	July 5	9 27	17

The f *Shoulder.*

	h m	°		h m	°
April 17	10 15	52	June 6	11 25	51
May 4	9 17	54	9	8 55	52
16	9 10	54	11	10 30	50
18	10 42	50	16	9 43	53
28	9 0	52	July 5	10 25	52
30	10 41	53	15	8 42	52

The longitudes of the central meridian have not been corrected for phase.

III.

Measures.

Latitudes and Widths of Bands.

Dark Band 1 (*latitude*). (*The S. Temperate Band.*)

1899.	″	°	1899.	″	°
Apr. 30	−7·8	198	June 15	−8·1	219
May 5	−7·3	176	16	−7·5	9
30	−8·1	334	17	−7·8	141
June 13	−7·5	260	July 14	−8·0	236
14	−7·7	86	16	−8·2	194

The third column gives the longitude of the central meridian at the time of observation.

Mean −7″·8.

Middle of the Double Dark Band 2.3 (*latitude*). (*The S. Tropical Belt.*)

1899.	″	°	1899.	″	°
Apr. 17	−2·8	43	May 26	−2·6	111
22	−3·1	111	30	−3·1	316
30	−3·6	198	June 14	−3·3	68
May 4	−2·4	79	15	−3·2	219
5	−3·4	175	17	−3·0	159
16	−2·9	120	July 16	−2·7	194

Mean −3″·0.

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Middle of the Double Dark Band 4.5 (*latitude*). (*The N. Tropical Belt.*)

1899.	″	°	1899.	″	°
Apr. 22	+4·6	111	May 30	+4·5	316
May 5	+4·8	175	June 14	+4·6	68
16	+4·7	120	17	+4·4	141
26	+4·7	111	July 16	+5·1	194

Mean +4″·7.

South Edge of Dark Band 2 (*latitude*).

1899.	″	°	1899.	″	°
Apr. 17	−4·1	43	June 14	−4·2	68
May 5	−4·7	175	15	−4·6	219
26	−4·4	111	17	−5·2	141
June 13	−3·6	260	July 16	−4·7	194

Mean −4″·4.

North Edge of Dark Band 5 (*latitude*).

1899.	″	°	1899.	″	°
Apr. 17	+6·4	43	May 26	+6·1	111
May 5	+6·1	175	July 16	+6·4	194

Mean +6″·2.

Middle of the Central (*coloured*) *Zone* (*latitude*).

1899.	″	°	1899.	″	°
May 5	+0·8	175	June 14	+0·9	68
26	+1·3	111	17	+0·6	141
June 13	+1·0	260	July 14	+0·8	236

Mean +0″·9.

S. Edge of the N. Polar Shading (*latitude*).

1899.	″	°	1899.	″	°
June 13	+ 9·2	260	June 16	+12·4	9
14	+11·5	68	17	+11·4	141
15	+ 9·2	219			

Mean +10″·7.

N. Edge of the S. Polar Shading (*latitude*).

1899.	″	°	1899.	″	°
June 14	−10·1	68	June 16	− 9·2	9
15	− 9·2	219	17	− 9·6	141

Mean −9″·5.

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Dark-Band 6 (*latitude*). (*The N. Temperate Band.*)

1899.	″	°	1899.	″	°
June 14	+ 8·5	86	July 16	+ 10·0	194

Mean +9″·2.

Width of Dark Band 1. (*The S. Temperate Band.*)

1899.	″	°
June 14	1·1	86

Width of the Dark Bands 2.3. (*The S. Tropical Belt.*)

1899.	″	°	1899.	″	°
April 17	2·9	52	May 30	3·5	334
„ 22	3·3	111	June 13	3·1	260
„ 30	2·7	198	„ 14	2·8	68
May 4	3·4	79	„ 15	3·3	219
„ 5	3·2	175	„ 17	3·1	159
„ 16	3·4	120	July 14	2·9	236
„ 26	3·5	111	„ 14	2·9	272
„ 28	3·5	33	„ 16	2·7	194

Mean, 3″·1.

Width of the Dark Bands 4.5. (*The N. Tropical Belt.*)

1899.	″	°	1899.	″	°
April 17	4·9	52	May 30	3·5	334
„ 22	4·7	111	June 13	3·1	260
May 4	3·4	79	„ 14	3·5	68
„ 5	3·2	175	„ 17	3·7	159
„ 16	3·4	120	July 14	2·9	236
„ 26	3·5	111	„ 14	2·9	272
„ 28	3·8	33	„ 16	2·7	194

Mean, 3″·5.

Width of Bands 2.3, *the Central Zone, and Bands* 4.5.

1899.	″	°	1899.	″	°
April 17	10·8	43	June 13	9·2	260
„ 30	9·9	198	„ 14	11·0	86
May 4	10·6	79	„ 15	9·2	219
„ 5	11·4	176	„ 16	10·6	9
„ 16	11·0	120	„ 16	11·1	53
„ 16	10·8	120	„ 17	10·8	141
„ 26	11·8	111	July 14	9·3	236
„ 28	11·6	33	„ 14	9·1	272
„ 30	11·6	316	„ 16	9·2	194

Mean, 10″·5.

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Width of the Central Coloured Zone.

a. Direct Measures.

1899.	″	°	1899.	″	°
April 17	2·9	43	June 14	3·6	86
May 5	3·7	176	,, 17	3·7	141
,, 16	4·0	120	July 14	3·7	236
,, 26	4·7	111	,, 14	3·4	272
,, 28	4·1	33	,, 16	4·3	194
June 13	3·6	260			

Mean, 3″·8.

b. Width deduced from Measures of 2·3, 4·5, and 2 to 5.

3″·0, 3″·8, 5″·0, 4″·2, 4″·8, 4″·3, 4″·6, 3″·0, 4″·7, 4″·0.

Mean, 4″·1.

Note.—Band 5 extends more to the N. in some longitudes than in others.

Width of the Bright Zone 1 *to* 2.

1899.	″	°	1899	″	°
April 17	2·0	43	June 16	1·2	9
June 14	1·8	86	July 14	1·9	236

Mean, 1″·7.

Width of the Bright Zone 5 *to* 6,7.

1899.	″	°	1899.	″	°
June 14	1·6	86	July 14	2·7	272
,, 16	2·5	9			

Mean, 2″·3.

Note.—The width of this zone depends on the presence or absence of band 6.

The above measures are reduced to mean distance 5·20, but are not corrected for the latitude of the Earth above *Jupiter's* equator.

LATITUDES AND WIDTHS OF BANDS FROM 1895–96 TO 1898–99.

The S. Temperate Band (1).

	″			″	
1895–6	−8·7	10 nights	1897–8	−7·8	17 nights
6–7	−8·2	10 ,,	8–9	−7·8	10 ,,

The S. Tropical Belt (2,3).

	″			″	
1895–6	−3·9	20 nights	1897–8	−3·5	6 nights
6–7	−3·4	23 ,,	8–9	−3·0	11 ,,

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The N. Tropical Belt (4·5).

1895–6	+2″·4	30 nights	(single and narrow)
6–7	+4·1	16 „	(double)
7–8	+3·6	18 „	(single)
8–9	+3·0	14 „	(double)

The N. Temperate Band (6).

1895–6	+7″·4		1898–9	+9″·2	2 nights
7–8	+7·0	5 nights			

The Middle of the Coloured Central Zone.

1896–7	+0″·3	4 nights	1898–99	+0″·7	9 nights
7–8	+0·6	8 „			

The S. Edge of Band 2.

1895–6	−5″·7	20 nights	1898–9	−4″·4	8 nights

N. Edge of Band 5.

1895–6	+2″·4	30 nights	(single and narrow)
6–7	+6·0	17 „	(double)
8–9	+6·2	4 „	(double)

This band was single in 1897–98.

Width of the Dark Band 1.

1896–7	1″·1	5 nights	1898–9	1″·1	1 night
7–8	1·4	2 nights			

Width of the Equatorial Coloured Zone.

(Between dark bands 3 and 4.)

1895–6	3″·6	15 nights	1897–8	3″·6	11 nights
6–7	3·0	16 „	8–9	3·8	11 „

Width of the S. Tropical Zone.

(Between bands 1 and 2.)

1896–7	1″·7	5 nights	1898–9	1″·7	4 nights
7–8	1·4	5 „			

1899MNRAS..60...45G

Width of 2.3, *the Central Coloured Zone, and* 4.5.

1895–6	7″·9	20 nights	1897–8	8″·3	16 nights
6–7	10·9	23 „	8–9	10·5	18 „

Width of the Band 2.3.

1895–6	3″·3	30 nights	1897–8	3″·5	14 nights
6–7	3·8	20 „	8–9	3·1	16 „

Width of the Band 4.5.

1895–6	about 1″·0		Very narrow : single.
6–7	3·9	17 nights	(double)
7–8	1·3	11 „	(single)
8–9	3·5	14 „	(double)

Width of the Band 1. (*S. Temperate Band.*)

1896–7	1″·1		1898–9	1″·1	1 night
7–8	1·4	2 nights			

IV.

Notes on the Satellites and their Shadows.

1889 May 6. II. transit I.—Ingress about $9^h\ 42^m$; it was much brighter than the limb, but grew gradually fainter, and was but just visible when in mid-transit. It moved along a narrow bright zone between two grey bands a good way N. of the equator.

1899 May 7. I. transit I. Satellite much brighter than the limb ; grew fainter as it advanced ; was very faint at $9^h\ 25^m$; invisible at $9^h\ 35^m$. It moved along a bright zone.

1899 May 30. I. transit I. Ingress about $8^h\ 51^m$; invisible at $9\frac{1}{2}^h$ and 10^h. It moved along the N. edge of the N. equatorial dark belt, and was again visible at $10^h\ 40^m$. It did not appear dusky or dark at any time during transit. The shadow's ingress took place about $9^h\ 37^m$. It often seemed elongated in a direction parallel to the equator during the first hour of transit ; when central it was circular. At and after central transit it seemed smaller than before transit. The same remarks apply to the transit of the shadow of I. on June 6.

On June 15 the shadow of I. was watched during the first half of its transit ; no changes of shape were seen : central about $8^h\ 50^m$.

On July 15 I. was observed at ingress : it moved along a ark band, and became invisible 20^m after ingress at $8^h\ 50^m$.